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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/511,784

10/15/2004

William R Priedeman JR.

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EXAMINER

GOFF II, JOHN L

ART UNIT

PAPER NUMBER

1791

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/511,784	<b>Applicant(s)</b> PRIEDEMAN ET AL.	
	<b>Examiner</b> John L. Goff	<b>Art Unit</b> 1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 05 May 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-5,8,10,11,16,18-23,27,28,33 and 36-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5,8,10,11,16,18-23,27,28,33 and 36-42 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 October 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>5/5/08</u> .  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. This action is in response to the amendment filed on 5/5/08.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

#### ***Claim Rejections - 35 USC § 103***

3. Claims 1-3, 8, 10, 11, 16, 18, 21, 22, 27, 28, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (Specification pages 1-4 and 8) as exemplified in part by Crump (U.S. Patent 5,121,329) in view of Joseph et al. (U.S. Patent 3,807,054) or Edmonds (U.S. Patent 5,448,838).

The admitted prior art discloses it was known to make a three-dimensional object by building an object from a thermoplastic modeling material using fused deposition molding wherein the built object has an object surface formed of the modeling material including an object surface formed of a plurality of layers as exemplified by Crump (Page 1, line 6 - Page 2, line 15 of the specification and Column 3, lines 64-66 of Crump). The admitted prior art further teaches the object surface formed of the modeling material due to the fused deposition molding exhibits a surface roughness effect that detracts aesthetically wherein manual/by hand techniques were known for smoothing the object surface (Page 2, line 16 - Page 3, line 17 of the specification). It is extremely well known in the art that thermoplastic object surfaces formed as having a surface roughness may be smoothed by exposing the object to vapors of a solvent such as methylene chloride that transiently softens the thermoplastic material at the object surface and

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reflows the softened thermoplastic material to uniformly smooth the object surface as shown by Joseph or Edmonds (Figure 6 and Column 1, lines 5-11 and Column 2, lines 3-11 and Column 4, lines 1-17 of Joseph and Figure 1 and Column 1, lines 6-14 and Column 2, lines 6-10 and 52-56 and Column 3, lines 1-8 of Edmonds), it being further noted the admitted prior art recognizes smoothing plastics with vapors of a solvent was known (Page 3, line 18 - Page 4, line 20 of the specification). It would have been obvious to one of ordinary skill in the art at the time the invention was made to smooth the object surface as taught by the admitted prior art as exemplified in part by Crump by using vapors of a solvent as was well known and shown by Joseph or Edmonds to easily and uniformly smooth the object surface without having to manually do so by hand.

Regarding claim 8, the length of time the object is exposed to the solvent vapors as taught by the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds is considered selected as a function of the concentration of the solvent vapors prior to exposing the object.

Regarding claims 10, 11, 27, and 28, the admitted prior art discloses known solvent masking substances include gum, waxes, pastes, adhesives or masking tape (Page 8, lines 24-26). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds known solvent masking substances such as those shown by the admitted prior art as a function of inhibiting smoothing in areas where aesthetically surface roughness or other non-smoothing effect is desired wherein the specific technique for applying the substances which are similar to the thermoplastic molding material would have included the same fused deposition

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molding equipment as used to apply the thermoplastic molding material such that further equipment is not required. Regarding claims 16, 18, and 33, the admitted prior art discloses the fused deposition molding equipment includes a computer aided machine (CAM) operating in conjunction with a computer aided design procedure (CAD) as exemplified in Crump (Column 1, lines 15-24) which computers are considered to create a digital representation of the final three-dimensional object and control the fused deposition molding equipment to form the final three-dimensional object. It would have been obvious to one of ordinary skill in the art at the time the invention was made that the solvent masking substances as taught by the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds would be represented in the software used in the CAD/CAM system such that the system is capable of modeling the final three dimensional object and controlling the equipment to form the object which software is considered to create the digital representation of the object surface area from any of the two well known input modeling functions, e.g. an algorithm or input from the user, e.g. via a haptic input interface.

4. Claims 4, 5, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art as exemplified in part by Crump and Joseph or Edmonds as applied to claims 1-3, 8, 10, 11, 16, 18, 21, 22, 27, 28, and 33 above, and further in view of Dahlin et al. (U.S. Patent 6,022,207).

The admitted prior art as exemplified in part by Crump and Joseph or Edmonds teach all of the limitations in claims 4, 5, and 23 except for a teaching of the specific thermoplastic material used, it being noted the admitted prior art makes reference to Dahlin as a known rapid prototyping technique. Dahlin directed to rapid prototyping similar to the admitted prior art

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discloses a particularly suitable thermoplastic is ABS (Column 4, lines 3-4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use as the thermoplastic material in the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds ABS a known suitable material such as shown by Dahlin.

5. Claims 19, 20, 36-39, 41, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art as exemplified in part by Crump and Joseph or Edmonds as applied to claims 1-3, 8, 10, 11, 16, 18, 21, 22, 27, 28, and 33 above, and further in view of Leyden et al. (U.S. Patent 5,143,663).

The admitted prior art as exemplified in part by Crump and Joseph or Edmonds teach all of the limitations in claims 19, 20, 36-39, 41, and 42 except for a teaching of modifying an initial object representation to pre-distort certain features of the surface geometry, it being noted the CAD/CAM system taught by the admitted prior art as exemplified in part by Crump is considered to provide an initial object representation in a digital format wherein the initial object representation has a surface geometry, the object built in the building step has a geometry defined according to the object representation, and the geometry attained following the exposing step approximately matches that of the initial object representation, and the admitted prior art makes reference to Leyden as a known rapid prototyping technique. Leyden directed to rapid prototyping similar to the admitted prior art discloses the object is built oversize to that after the surface roughness is removed the object will be the right size (Column 7, lines 25-36). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds a step of modifying the initial object representation to pre-distort certain features of the

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surface geometry so that after the surface roughness is removed the object will be the right size as shown by Leyden.

Regarding claim 37, the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds and Leyden is considered to identify features of the surface geometry for pre-distortion according to their radii of curvature.

6. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art as exemplified in part by Crump and Joseph or Edmonds and Leyden as applied to claims 19, 20, 36-39, 41, and 42 above, and further in view of Dahlin.

The admitted prior art as exemplified in part by Crump and Joseph or Edmonds and Leyden teach all of the limitations in claims 4, 5, and 23 except for a teaching of the specific thermoplastic material used, it being noted the admitted prior art makes reference to Dahlin as a known rapid prototyping technique. Dahlin directed to rapid prototyping similar to the admitted prior art discloses a particularly suitable thermoplastic is ABS (Column 4, lines 3-4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use as the thermoplastic material in the admitted prior art as exemplified in part by Crump and as modified by Joseph or Edmonds and Leyden ABS a known suitable material such as shown by Dahlin.

### ***Response to Arguments***

7. Applicant's arguments filed 5/5/08 have been fully considered but they are not persuasive.

Applicants argue, “The Joseph ‘054 patent and the Edmonds ‘838 patent merely disclose systems and processes for smoothing the surfaces of plastic articles with solvent vapors, and do not suggest that the surfaces of the plastic articles have surface effects due to the layered manufacturing rapid prototyping technique used. In fact, as discussed below, Leyden et al., U.S. Patent No. 5,143,663 (“the Leyden ‘663 patent”), which involves a layered manufacturing rapid prototyping technique, illustrates that the vapor smoothing technique disclosed in the present application is not suitable for all forms of layered manufacturing rapid prototyping techniques.”.

The admitted prior art as exemplified in part by Crump discloses fused deposition molding of thermoplastics forms surfaces that are textured or layered due to their layered formation which layers are then manually smoothed for aesthetic reasons. It is extremely well known in the art that thermoplastic object surfaces formed as having a surface roughness, i.e. surfaces similar to or the same as those formed in the fused deposition molding taught by the admitted prior art as exemplified in part by Crump, may be smoothed by exposing the object to vapors of a solvent such as methylene chloride that transiently softens the thermoplastic material at the object surface and reflows the softened thermoplastic material to uniformly smooth the object surface as shown by Joseph or Edmonds it being further noted the admitted prior art recognizes smoothing plastics with vapors of a solvent was known. Thus, the combination of the admitted prior art as exemplified in part by Crump with Joseph or Edmonds is *prima facie* obvious as more fully set forth above.

Regarding applicants arguments to Leyden, Edmonds teaches “It should be noted that any type of plastic can be finished using the finishing apparatus of the present invention” (Column 3, lines 6-8). One of ordinary skill in the art would have a reasonable expectation of success that



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modifying the admitted prior art as exemplified by Crump with Joseph or Edmonds both of which use thermoplastic materials would smooth the roughened surfaces as described in Joseph or Edmonds. Further as noted by applicants “Because the cured resin disclosed in the Leyden ‘663 patent has a low solubility in solvent vapors, exposure to the solvent vapor does not soften the cured resin at the surface of the object, and does not allow the cured resin to reflow.”, Leyden is directed to cured resins and not thermoplastic materials as in the admitted prior art as exemplified by Crump, Joseph, and Edmonds such that the teaching in Leyden that solvent vapor does not soften the cured resin at the surface of the object is not relevant to the admitted prior art as exemplified by Crump as modified by Joseph or Edmonds. Leyden is applied solely in view of the teaching at column 7, lines 30-34 “Alternatively, as explained in those applications, sometimes the part is built deliberately oversized so that after sanding to remove the stairstep appearance, the part will be the right size.” which teaching is applicable to any rapid prototyping technique including fused deposition molding, stereolithography, etc.

### ***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **John L. Goff** whose telephone number is **(571) 272-1216**. The examiner can normally be reached on M-F (7:15 AM - 3:45 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (571) 272-1226. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/John L. Goff/  
Primary Examiner, Art Unit 1791